ABSTRACT

An image-guided radiosurgery method and system are presented that use 2D/3D image registration to keep the radiosurgical beams properly focused onto a treatment target. A pre-treatment 3D scan of the target is generated at or near treatment planning time. A set of 2D DRRs are generated, based on the pre-treatment 3D scan. At least one 2D x-ray image of the target is generated in near real time during treatment. The DRRs are registered with the x-ray images, by computing a set of 3D transformation parameters that represent the change in target position between the 3D scan and the x-ray images. The relative position of the radiosurgical beams and the target is continuously adjusted in near real time in accordance with the 3D transformation parameters. A hierarchical and iterative 2D/3D registration algorithm is used, in which the transformation parameters that are in-plane with respect to the image plane of the x-ray images are computed separately from the out-of-plane transformation parameters.